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DISEASES of the CHEST

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DISEASES OF THE CHEST

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C. M. HENDRICKS, EDITOR-IN-CHIEF

(A MONTHLY PUBLICATION)

"The most important factor in diagnosis in the majority of cases of pulmonary tuberculosis is keeping the disease in mind."
Lawrason Brown, M. D.

Editorial Comment

Convention Federation of American Sanatoria

TUBERCULOSIS is a disease that can only be managed adequately by hospitalization, at least until stabilization is obtained.

Modern treatment has successfully invaded the field of far advanced tuberculosis, an invasion that calls for intensive treatment of the disease. This intensive treatment is available early in the workshop, namely, the tuberculosis sanatorium.

State Medicine has come very close to the management of tuberculosis in the United States. Municipal, County, State and Federal hospitalization of this disease has attained such proportion that it must be recognized that State Medicine has arrived so far as tuberculosis is concerned.

There are proper invasions of the State into the Tuberculosis problem because it is a major transmittible disease. Proper hospitalization for the indigent of the Community or State should be made available by the Community or State, not only that the individual may be treated and his health-menacing environment destroyed, but his isolation is a necessity while he is an open case.

But State Medicine can go too far in invading the hospitalization of this disease. Not only because the State should not enter into competition with the private practice of medicine, but obviously State hospitalization can never bring to the patient the complete service that the private hospital or sanatorium can.

Whether Fascist Italy, Communist Russia or in our own free land, State service must always be "the greatest good for the greatest number." State hospitalization of tuberculosis is the greatest good for the greatest number. Individual study of the case, choice of the therapeutic agent applicable for the individual case, and the execution of this selective treatment cannot be carried out in the State institutions.

Intensive and elective treatment for the individual case is the modern sphere for the private sanatorium in the management of tuberculosis. Never before has there been such a demand for elective treatment of individual cases as the present, when pneumothorax and surgery have made such inroads into the adequate management of far advanced stages of this disease.

It should be borne in mind that the surgical procedure in pulmonary tuberculosis removes no pathology but is only the preliminary step of a long-drawn-out period of one to six years of intensive treatment and convalescence to the end that the more advanced stages of this disease can be satisfactorily fibrosed.

The above is an outline of discussion of the Executive Council meeting of the FEDERATION OF AMERICAN SANATORIA held at the Franciscan Hotel in Albuquerque, New Mexico, on August 9, 1935. The representatives of private sanatoriums treating tuberculosis in the United States and physicians limiting their work to the specialty

of tuberculosis had assembled for the first annual meeting of the above-named organization. Dr. LeRoy Peters of Albuquerque, New Mexico, presided, and contributing to the discussion were Dr. Frank Porter Miller of Monrovia, California, Dr. Louis Mark of Columbus, Ohio, Dr. C. M. Hendricks of El Paso, Texas, Dr. F. M. Pottenger of Monrovia, California, Dr. R. B. Homan, Jr., of El Paso, Texas, Dr. Max Rothschild of San Francisco, California, and Dr. Orville Egbert of El Paso, Texas.

The first Convention Meeting of the FEDERATION OF AMERICAN SANATORIA was called to order by Dr. LeRoy Peters of Albuquerque, at 10:00 a.m., August 10, 1935, in the Franciscan Hotel in Albuquerque. Dr. Peters appointed the following committees:

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Dr. O. E. Egbert, El Paso, Texas, Chairman
Dr. C. O. Hook, Ft. Worth, Texas
Dr. Frank P. Miller, Monrovia, California
Dr. William H. Thearle, Albuquerque, N. M.
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Dr. J. J. Barfield, Colorado Springs, Colo.
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Dr. Frank Mera, Santa Fe, N. M.

Ways and Means

Dr. Max Rothschild, San Francisco, Calif., Ch.
Dr. Sam F. Watson, Tucson, Arizona
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Dr. R. B. Homan, Jr., El Paso, Texas, Chairman
Dr. A. Minnig, Denver, Colo.
Dr. V. L. Mahoney, Tucson, Arizona
Dr. Carl Mulky, Albuquerque, N. M.

The Convention was called to order again in the afternoon at 2:00 p.m. by Dr. C. M. Hendricks, Dr. Frank Porter Miller serving as temporary secretary. Report of committees was called for. In each instance these reports brought out sparkling and valuable discussion. All committee reports were adopted. It was decided to publish the proceedings of this first annual convention in full.

Kansas City was chosen for the next convention, and the date was set for June 6th, 1936. The following officers were elected:

President—Dr. William Devitt, Allenwood, Pa.
Vice-President, Pacific District — Dr. Ralph Matson, Portland, Oregon
Vice-President, Southwestern District—Dr. Sam H. Watson, Tucson, Arizona
Vice-President, Central District — Dr. Louis Mark, Columbus, Ohio
Vice-President, Southern District—Dr. Chas. Cocke, Asheville, N. C.
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Editorial Board—
1. Dr. Arnold Minnig, Denver, Colorado, 3 years
2. Dr. C. M. Hendricks, El Paso, Texas, 2 years
3. Dr. Champneys H. Holmes, Atlanta, Ga., 1 year

The honor guest of the Convention was Sir Henry Gauvain of London, England, who addressed the assembled delegates at 2:00 p.m. He talked on the social and economic problem of tuberculosis in the United Kingdom.

The Federation Meeting was closed with a banquet at 8:00 p.m., with Dr. W. A. Gekler of Albuquerque as Toastmaster. The principal addresses of the evening were delivered by Dr. F. M. Pottenger of Monrovia and Dr. Louis Marks of Columbus, Ohio.

Friends of DISEASES OF THE CHEST, we trust, will be happy to know that the Federation in its first meeting was as enthusiastic about the success of this journal in

its first year of existence and were unanimous in their desire to perpetuate it, and made plans for its editorial and economic existence that will insure its readers of another year that promises to be bigger and better than the first. O.E.E.

Some Fallacies in the Treatment of Pulmonary Tuberculosis

UNFORTUNATELY there has not yet been found a remedy, either medicinal or otherwise, which has met the requirements of a specific in the treatment of tuberculosis of the lungs. It is true that there are now in use a number of remedial measures each of which is helpful in its way, and if these are used judiciously, either singly or in combination as may be indicated in the individual case, many tuberculous persons may be enabled to overcome the disease and become completely rehabilitated.

Of these remedies there can be no question that rest is the one of prime importance. Having this knowledge it is not difficult to imagine our surprise when we were called recently to see a young man about nineteen years of age who, together with his parents, had come to the Southwest because he had tuberculosis and who had been instructed by his home physician that it was not necessary to consult a physician when he reached his destination, but to walk five miles every day, adding that some days he would not feel equal to doing it but to go any way. The young man had religiously followed these instructions until the morning on which we were called when he fell from exhaustion before completing the five miles. It is not difficult to surmise what the result of such treatment would be.

In no other disease has there been such imposition in the way of treatment as there has been in tuberculosis. Almost everything has been suggested and tried from the drinking of warm beef blood, up and down the line. We are too prone to accept methods of treatment as being meritorious without taking time to reason out the possibilities in the light of the knowledge which we have of tuberculosis, especially concerning its pathology.

One of the fallacies which has come into use in some sections, and which has really had the approval of some physicians, is the inhalation of vaporized oils which are supposed to hold in suspension various medicinal preparations which are designed to destroy the tubercle bacillus.

Such treatment is practically without any value for the following reasons:

1. No chemical agent is known which will destroy the tubercle bacillus by contact, which could be taken into the bronchial tubes or air cells with safety to these tissues. In other words, any medicinal agent which would destroy the tubercle bacillus in situ would seriously damage the lung tissue as well.

2. In the lesions where cavitation has not taken place it is impossible to reach the bacillus by preparations used in this manner.

3. Granting that it is possible to fill a cavity with any kind of vapor or gas by inhalation, (and that is doubtful), and that such a preparation would destroy the bacilli with which it comes in contact, the treatment would still be ineffective inasmuch as the bacilli which are responsible for the destruction of lung tissue and production of toxic poison are for the most part working around and outside of the cavity, and are protected from approach by such gases or vapor by the dense cavity wall.

4. If rest of the lung promotes healing, and we believe it does, then the forced deep inspiration necessary to getting such preparation into the air passages would retard healing.

In the interest of the patient we plead for the use of more serious thought and mature judgment upon the part of physicians in the selection of methods of treatment in tuberculosis. Let's not take up with the fads and fallacies which have no foundation in fact for the virtues claimed for them. R.B.H.

Sunlight in Tuberculosis

BY
A. R. MASTEN, M. D.
Lutheran Sanatorium
Wheatridge, Colorado

HELIOTHERAPY, or the treatment of disease by sunlight, is one of the most ancient therapeutic measures employed by man. The ancient Greeks, however, appear to have been the first people to use this method of treatment in a rational manner. The name heliotherapy is derived from two Greek words: Helios, meaning the sun, and therapeia, meaning healing power. Hippocrates (460 B. C.), "the Father of Medicine," used sunlight in treating tuberculosis; in fact, he used what appears to be a very modern treatment for this disease, since he recommended that the sufferer be sent away to the hills beyond the city, where he would have plenty of rest, fresh air and sunshine. The Greeks used heliotherapy for many other diseases also, and most of the large Greek houses had solariums or, as they were called, helioses. The great temple dedicated to the Greek God of Medicine, Aesculapius, was situated on the slope of a mountain facing the south and at an altitude of three hundred feet above the sea, thus giving it a maximum amount of fresh air and sunlight for that vicinity. No doubt most of the marvelous cures ascribed to this famous shrine were due in large part to the healthful location in which it was situated and particularly to the healing effects of sunlight. In the Western hemisphere, the Incas of Peru had great faith in the healing powers of the sun and treated many ailments by sunbaths. The use of sunlight for treating diseases has been widely advocated, but in many instances indiscriminate use of this treatment led to failure and, in the end, disrepute of the method. Modern scientific use of heliotherapy for tuberculosis dates largely from 1903, when Rollier began his work with the use of sunlight in surgical tuberculosis at Leysin in the Swiss Alps. Rollier achieved such remarkable success with his method of treatment that he became the outstanding figure in the field of light therapy and initiated a period of intensive study upon the physiological and therapeutic effects of light, which has been carried on throughout the world. Today, a great deal is known about the physical nature of sunlight, as well as its beneficial and harmful effects upon the human body. This knowledge has shown that in many diseases sunlight is of great value, while in others it is not only valueless but is frequently harmful. Not only do the results of heliotherapy vary with different diseases, but also with different individuals with the same disease, so that it is very important for every sick person to consult a physician before he takes sunbaths.

Sunlight is composed of waves of different lengths which, when passed through a prism, are broken up into the colors of the rainbow. This rainbow image is called the spectrum of the sun. The portion of the spectrum which is visible to the human eye is only part of the sun's spectrum, however, for there are rays both below and above the section which is seen as the rainbow. The different colors of the rainbow each have a different wave length, with the red the longest and the violet the shortest of the visible rays. Between these two colors are arranged the orange, yellow, green, blue and indigo which pass into each other without sharp boundaries of separation. Physicists measure these light rays in what are called Angstrom units, each unit being equal to one ten-millionth of a millimeter (a millimeter equals 0.03937 of an inch). The waves which appear as red to the human eye have a wave length of 7,000 angstrom units, while the violet rays have a length of 4,000 angstrom units. The wave lengths of light longer than 7,000 angstrom units are called infra-red rays and are largely heat-producing. The wave lengths shorter than 4,000 angstrom units are called ultra-violet rays and it is these which play the

most important part in heliotherapy. These rays also are the main ones which produce chemical action and are sometimes called chemical rays. Their chemical action is quite evident in photography, where the chemical substances in the photographic film are extremely sensitive to the rays of shorter wave lengths and are practically inert when exposed to the long rays. For this reason films can be developed in red light without being affected. In the upper layers of the atmosphere the ultra-violet rays react on the atoms of oxygen and cause them to link together, forming ozone which is highly bactericidal. This action destroys most organic impurities in the air and, at the same time, renders it healthful; in fact, air which has been exposed to strong sunshine produces many of the effects of sunshine itself. At low altitudes there is such a thick layer of atmosphere to be penetrated by the light rays that most of the health-giving ultra-violet rays are consumed before they reach the earth. In the high altitudes, however, the thinner layer of air, as well as the lightness of the air, prevent it holding any great amount of foreign matter, or moisture, etc., and, consequently, the ultra-violet rays reach the earth in much greater numbers than at the lower levels. For example, it has been found that at Denver, Colorado, (altitude one mile) the effects of sunlight are as efficient in the middle of winter as the rays are at Toronto in the strong sunlight of summer. This efficiency of the sun's rays is also affected by latitude, since practically all ultra-violet rays are filtered out if the sunshine strikes the earth at an angle of less than 35 degrees.

Sunlight has been said to be the most important climatic factor in relation to the treatment of tuberculosis. This is particularly true in relation to extra-pulmonary tuberculosis, but applies to a certain extent in all types of tuberculosis. In the pulmonary variety, however, direct exposure of the body to the sun is seldom indicated, since the sun-bathed air contains all the ultra-violet rays that can be tolerated by most patients.

One of the most important effects of sunlight is the mental help given to a patient. Rollier states that the close relationship between sunshine and happiness is so obvious that it requires no emphasis. He says, "Anyone who has seen the splendor of a typical winter's day in the Alps, with its brilliant sunshine and still, cold air, will realize what a stimulating effect it has. The psychical counterpart of this environment is a condition of hope and confidence, which undoubtedly influences the evolution of tuberculosis favorably, and the ultimate issue of a case is to a large extent dependent on the mental condition of the patient; for the struggle with this disease is bound to be a long one and the patient's courage and endurance are constantly called into play."

Besides its action on the mind, sunshine has many definite physiological actions. The exposure to direct sunlight readily effects the destruction of tubercle bacilli, especially in the presence of abundant oxygen. Obviously, this has an important action in keeping the air and soil free from tuberculosis germs in those climates where sunlight is not obstructed by clouds, moisture, extreme depths of atmosphere, smoke, etc. The ultraviolet rays have also a bactericidal effect to a depth of 1.5 mm. in the human skin and have a weakening effect on bacteria to the depth of 4 mm. Sunlight also increases the metabolism of the body, producing a marked improvement in general nutrition and an increase of the musculature. Animal experiments also indicate that sunlight increases the bacteria killing power of the blood, probably by improving the functions of the leucocytes. These cells are increased not only in numbers, but show increased powers of phagocytosis. Sunlight also increases the efficiency of the blood by stimulating the production of red blood cells and increasing their haemoglobin content.

In addition, sunlight acts as a general tonic to the whole body. It strengthens the skin, improves the musculature better than the best massage and, at the same time, strengthens the thoracic and abdo-

minal organs so that the internal secretions are increased, digestion becomes regular, weight increases and strength is renewed. In a word, sunshine is the best tonic known.

Another effect of ultra-violet light on the body is the marked accentuation of calcium metabolism. This action is used to prevent and cure the disease, rickets, which is a deficiency disease formerly treated with cod-liver oil. The cod-liver oil and the light probably act in the same way; that is, by supplying vitamin D, the lack of which has long been known to produce rickets.

In recent years, the knowledge that ultra-violet light produced so many apparently beneficial effects has led to its use for all manner of disease, in many of which it has produced more harm than good. Active pulmonary tuberculosis is one of the diseases where it produces much harm, for, as we said above, sunlight increases the body metabolism and, since tuberculosis increases the metabolism, particularly catabolism, far above normal, it is apparent that efforts should be made to lower the metabolism rather than raise it. In extrapulmonary tuberculosis (tuberculosis outside the lungs, like tuberculosis of the spine, kidney, bowels, skin, etc.), however, heliotherapy is often of great help in aiding recovery. In chronic fibro-caseous pulmonary tuberculosis it is also often useful, but is never indicated in the exudative type or, as was said above, in any active case of pulmonary tuberculosis. For these reasons, sunbaths should never be taken by a person suffering with tuberculosis without first consulting a physician who has familiarized himself with the effects of heliotherapy. For the person with pulmonary tuberculosis, the mainstays of treatment are still REST, good food and fresh air.

When heliotherapy has been decided upon in a given case, it is important to follow a definite system of exposure. The lower, or less sensitive parts of the body, should be exposed first, and gradually this area should be extended to cover the whole body except the head and nape of the neck. The feet are usually exposed the first day of treatment. This exposure should last for five minutes and can be repeated three times during the day if there are intervals of at least fifteen minutes between exposures. On the second day the feet are exposed ten minutes and the legs five minutes. On the third day the feet are exposed fifteen minutes, the legs ten minutes and the thighs five minutes. On the fourth day the feet should have twenty minutes, the legs fifteen minutes, the thighs ten minutes and the abdomen and hands five minutes. On the fifth day the feet get twenty-five minutes, the legs twenty minutes, the thighs fifteen minutes, the abdomen and hands ten minutes and the chest and arms five minutes. The sixth day the feet get half an hour and they are held at this point until the rest of the body is gradually increased by five minutes a day up to the half-hour period, after which the whole body can be exposed the same length of time. The exposures are now increased five minutes a day until two or three hours are taken every day. This is as much as is necessary to obtain any beneficial results obtained by exposure to sunshine. The time of treatment is divided equally between the two sides of the body and usually one exposure is as much as can be tolerated comfortably and safely, even where the patient reacts favorably to light. All persons do not react in an equally favorable way. In general, blondes react poorly, while brunettes react well, although there are many exceptions to this. Whenever the treatment produces irritability, fatigue, headache, dizziness, lassitude, elevation of temperature, increase of pulse rate or respiration, or drop of blood pressure, the exposure is too long. If these symptoms continue after the exposure time is diminished, it is an indication that the treatment should be discontinued, for in whatever type of case heliotherapy is used, it should always leave the patient feeling the same or better both during and after the treatment.

The best time for taking treatments with the natural sunlight is when the air

(Continued to page 22)

Keeping the Disease in Mind

BY
KENNETH PAUL JONES, M.D.
Olive View, Calif.

INTENSIVE SANATORIUM treatment with its regular hours, its development of the necessary discipline for the patients, its use of surgery, and its graduated exercise when getting well, offers the most satisfactory prospect for the patient with tuberculosis. But before the patient can be admitted to a sanatorium, he must be diagnosed.

Possibly the most exasperating thing to the T. B. specialist is to see case after case which had wonderful prospects of a cure if it had been discovered earlier. So that the words of Lawrason Brown at the masthead of this journal, "The most important factor in diagnosis in the majority of cases of pulmonary tuberculosis is keeping the disease in mind," together with Osler's words to the man in general practice, "The leadership of the battle against tuberculosis is in your hands," definitely place the responsibility of saving lives and preventing new cases, by the early discovery of tuberculosis, directly in the hands of the general practitioners.

While it is hardly to be expected that a general man who sees comparatively few chest cases, should diagnose the very early or the very doubtful case, yet with the still large number of cases being discovered in the United States and the fact that most of them are in the far-advanced category, it seems to me that "keeping the disease in mind" is a most important admonition.

Its importance can best be illustrated by the following cases which recently passed through the admitting office of Olive View Sanatorium. These cases were so striking in the quite evident lack of using all available and recognized attempts to arrive at a diagnosis that I have summarized the cases in table form. The X in the various columns of presumptive and positive signs of tuberculosis indicate those symptoms complained of when the patient went to his physician before finally being diagnosed and admitted. Not all patients showed all signs and symptoms. They rarely do. But with signs shouting for a chest examination, you will note that in not one case did the previous physician use the common aids to diagnosis, sputum test and/or X-ray. All were far advanced cases when admitted.

I do not for a moment imply that the symptoms as shown by these patients, or by any patient, give one a clear-cut diagnosis, but given any one of the above cases, and with tuberculosis as prevalent as it is, then I do maintain that an X-ray and sputum test were indicated to *eliminate* tuberculosis, and that failure to use such aids bordered closely on neglect of duty. Or if there was any hesitation or doubt in the physician's mind, he should have sent the patient to a chest specialist.

There is no royal nor easy road to diagnosis, but it seems to me there are a few simple precepts which every one seeing the ordinary run of patients should keep in mind and use. Such precepts might be as follows:

(1) Be suspicious of every case of so-called influenza.

Many men believe this is often a flare-up of tuberculosis.

(2) Take a careful history of the patient and *of his family.*

(3) Use the stethoscope, X-ray and sputum.

(4) Having discovered a true case, have all contacts examined.

(5) Don't temporize with active tuberculosis any more than you would temporize with an appendix which needed active treatment.

(6) Send your patient to a sanatorium and under the care of a competent specialist.

I think it well to recall to your mind that tuberculosis is still the most important killer and disabler in the age grouping from 20 to 45, the most useful years of one's life. If the pendulum of diagnosis

could be swung from a majority of far-advanced cases to a majority of early cases, and these cases could be given a period of intensive treatment in a sanatorium, the results would be little short of astounding.

SYMPTOMS BY PATIENTS WHICH SHOULD HAVE CAUSED TUBERCULOSIS TO BE KEPT IN MIND

No. Pts.	Cough	Sputum	Fever	Sweats	Hemorrhage	Anorexia	Weight Loss	Malaise	Pleurisy	
1	x	x	x							Symptoms 2 mos. Went to physician; no X-ray, sputum nor chest exam.
4	x	x		x			x		x	Symptoms started 2 yrs. ago; went to physician; sputum ordered; no X-ray.
5	x			x		x	x	x	x	Symptoms 1 year; went to various physicians; no sputum, X-ray, exam.
6	x	x	x			x			x	Symptoms 8 months; no sputum, X-ray or exam.
7	†	x				x		x		Symptoms for 1 year; no sputum, X-ray or exam. Told to stop work.
8	†	x					x	x		Symptoms for 4 years; no X-ray nor sputum by doctor during that time.
9	x		x				x		x	Symptoms 3 months. Went to doctors; No sputum, X-ray nor chest exam.
11	x	x	x		x		x		x	Symptoms 11 months; same story.
	Specialists treated for "stomach trouble"									
12	x			x	x	x	x			Symptoms 4 months; same story.
13	x	x		x						Symptoms for 2 months; same story. Told to take deep breathing.
14	x	x	x	x			x	x		Symptoms for 3 years; same story.
15	x				x	x			x	Symptoms 2 months; same story, but told to stay in bed.
17			x			x	x		x	Symptoms 3 years. No X-ray, no sputum.
18	x		x				x			Symptoms 3 weeks. No X-ray, sputum or exam.

† Hawking.

Early Pulmonary Tuberculosis †PART II.—TREATMENT

BY
S. C. DAVIS, M.D.*
and
REDFORD A. WILSON, M.D.*
Tucson, Arizona

IN A RECENT communication in this journal, we attempted to point out the necessity of making the diagnosis of pulmonary tuberculosis as early as possible. We attempted to enumerate some of the facts which should point to the suspicion of this disease and lead to an intensive search for tuberculosis. In this paper we hope to bring out some equally important points in the treatment of this disease.

Volumes have been written, since the time of Trudeau, on the necessity of liberal diet, fresh air, and rest; but there has not been enough said about the use of collapse measures in early stages of this disease. Previously, we showed that a large proportion of the patients we see come to us with advanced lesions. One reason for this fact is that the patient does not present himself during the minimal stages. No less important a reason, however, for this deplorable state of affairs, is that all too often the diagnosis is made early, and the patient is advised to "take it easy." Instead of resting, the patient loafs for a few weeks or months, begins to feel better, and returns to his duties with his disease still actively progressive. Then there is that very large group of patients who are advised of their condition and are put to bed as their sole treatment. Some improve, and the bed rest is all that is necessary; on the other hand, there are many, so many, whose lesions fail to retrogress and who have their minimal lesions slowly but surely progress to advanced cases with cavitation.

A little active treatment at this point would stop the progress of the lesion and save the life of the patient, or at least months of invalidism. Furthermore, were active collapse measures used early and wisely, we would cut our percentage of advanced cases very markedly. We would have fewer cases for bilateral collapse therapy and not nearly so many needing thoracoplasty. In this enlightened age there are fortunately fewer and fewer in this former group who are advised simply to take it easy. Thanks to the persistent efforts of practically all writers and lecturers on tuberculosis, the medical profession and even the laity have come to more nearly realize the meaning of rest in tuberculosis. They have come to understand that there is no substitute for this all-important point in their treatment. They have come to accept the necessity of prolonged rest—prolonged to the point of arrest of the disease, whatever that may be in terms of months or years. May we add our opinion to this oft-emphasized point. We are wholly and entirely in accord with the advocates of rest. It is important, indispensable, and can not be replaced by substitutes. It is, however, not enough if we hope to reduce this scourge among young people.

Our emphasis will now be on those patients who have a definite tuberculous process and who are to have the best form of treatment we can offer. We shall enter this discussion with one premise—when the diagnosis of pulmonary tuberculosis is made, and the stage of the disease is determined, we turn our whole thought to the arresting of this process in the most effective way possible and with the least sacrifice on the part of the patient in time and in loss of tissue. The most effective way is the employment of collapse therapy and bed rest. We insist that collapse measures should not be used as the "mop-up squad," as an editorial in these pages so aptly put it, but should be used to prevent the necessity of having a mop-up squad.

In the past so many phthisiologists have not looked with favor upon collapse measures. When used at all, they were used only as a last resort, and because of their use in this manner, their success has suffered proportionately. And so long as they

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are used as a last resort, they will be looked upon as deserving little consideration early in the course of the disease. When, however, we can come to look upon collapse as equal in importance to, if indeed not superior to, bed rest, our patient will be benefited proportionately, and our statistics on the efficacy of collapse will improve; then we will realize it is the first line of defense rather than the "mop-up squad."

We feel that if a patient with a very early lesion without cavitation can get well with bed rest alone, he can get well quicker and much more certainly with the added help of a temporary phrenic interruption (not exeresis). Therefore, we feel that a patient with this type of lesion should have this operation immediately. The point of time is important to most patients; of much greater importance, however, is the likelihood of complications if bed rest alone is depended upon. They are so much less likely, if his rest is supplemented with collapse procedures. Those complications are cavitation, hemorrhage, progressive spread of the pathology in the same or the contralateral lung, the spread to other organs, and the formation of pleural adhesions. The temporary phrenic interruption has been developed to such a point that it is practically without danger; the hemi-diaphragm usually resumes its function in six to nine months, as opposed to the permanent paralysis of phrenic exeresis, and no harm has been done to the patient. When the diaphragm is beginning to resume function, if the lung is not satisfactorily healed, it is perfectly permissible and simple to repeat the operation. This is done, of course, only when it is believed that a repitition of the operation is beneficial.

The decision as to the advisability of repeating the operation rests upon a very careful study of the patient. Consideration is given to his past and present status, to the onset of the disease, to the class of the lesion throughout his course while under observation, to the way the patient has reacted to treatment, and to the progress that has been made to date; and, most of all, consideration is given to determining if another phrenic crushing will be adequate to effect a cure, or whether other measures should be instituted. In this connection, we want to bring out the most important single point in the management of pulmonary tuberculosis, viz., when one method of collapse has been used and has failed to accomplish the desired purpose, one should immediately use another, or add another to complement it, and use these procedures successively or concurrently until the process is arrested. In other words, because of the fact that a patient has had a paralysis of the hemi-diaphragm without causing the improvement in due time, which you are justified in expecting, is no reason why he should not be given a pneumothorax. On the contrary, the failure to improve makes pneumothorax all the more imperative. Some of the cases do not respond sufficiently to the relaxation afforded by diaphragmatic paralysis and require the added relaxation of the pneumothorax. This should be instituted whenever it becomes apparent that the former operation was not sufficient. Let it be said here that an active lesion in the opposite lung does not contraindicate these measures. On the other hand, we have seen the contralateral lung clear up rapidly so often when its fellow is under collapse therapy, that we are convinced that bilateral lesions make it even more imperative to collapse the worse lung than if the lesion were unilateral.

If cavities exist when the patient first presents himself, or if cavities develop while under observation, that calls for unceasing efforts to close those cavities. We mean "unceasing efforts" literally—begin with the most effective measure in the largest number of cases, pneumothorax, and use it until the lesion is cured or until it is apparent that the pneumothorax alone will not effect an arrest; then follow immeditely with a measure or measures which will be effective. The effort must be unceasing and continuous. Pneumothorax is practically always indicated where there are cavities. Again, should

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The Community Tuberculosis Program

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THE PRIMARY MAXIM regarding tuberculosis should be: *Once tuberculous, always tuberculous.*

This does not mean that those so afflicted should abandon hope, but that such individuals must face the facts and adjust themselves to very definite rules of living. They must accept this adjustment in the same manner as those who are otherwise handicapped; the blind, the deaf, the crippled and the insane are examples found in large numbers in every community, who have oriented themselves to a new or different mode of life from their more fortunate fellow-citizens. State and social agencies have assisted in tuberculosis programs all over the country, a vast amount of work has been done in case-finding, diagnosis and treatment of active disease, but the problem of after care and rehabilitation is largely left to individual expedience.

Human progress has been accompanied by advances in art, literature and science. Public health is so important a part of the latter that had it been neglected, it is doubtful if we could have experienced any advances in the others. Its recognition is relatively recent in the history of civilization, yet, as our culture has progressed, it has been marked by steadily increasing perfection in the science of preventing communicable diseases. It is safe to say that historians of the future will mark that civilization most advanced in the nation that had the best public health program. Humanity, like all other nature, learns to protect itself by various compensations. Scientific public health methods will provide the necessary "compensations" for the human race against disease.

It is impossible to predict the exact means. It may come about by practicing physicians realizing their duty in a broader interpretation of responsibility to the people of their communities, or by that other extreme—State Medicine. If the medical profession does not provide the program, the people will provide it for them. Human nature being what it is, man will grope for solutions, blindly perhaps, committing errors doubtlessly, but ever onward. It is the duty of the medical profession to guide them truthfully; it is also necessary to the very life of our present system of medical practice to do so.

The Research Committee on Social Trends reported January 1, 1933: "Unemployment insurance, old age pensions, and *a consideration of compulsory health insurance.*" (The italics are mine.) The average practicing physician, given the training and equipment he now has, does not attempt to solve the problem of blindness, deafness, insanity and many other physical handicaps. Alone and unaided by community health organization, unprepared through lack of previous special training, he can not cope successfully with the tuberculosis problem.

A well-managed and well-thought-out tuberculosis program is an essential part of every public health organization, whether state or municipal. This article is chiefly concerned with the latter, but a large part of the program is equally applicable to county health organizations. Such a program should stress:

(1) Education, both for the public and the medical profession.

(2) The importance of the part played by the general practitioner.

(3) Case finding, initial and continuous.

(4) Maximum use of clinics, open air classes, preventoria and sanatoria.

(5) The importance of a high level of child health.

(6) Detailed and continuous study and analysis of the local problem.

(7) Maximum use of social welfare agencies in obtaining aid.

(8) The program must be emphasized

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in keeping with its importance but should be an integral part of the general health program.

There are a number of primary considerations:

(1) The early and frequent infection of children.

(2) Difficulty of early diagnosis.

(3) Dormant nature of the infection and mildness of early cases.

(4) Limitation of our knowledge of the disease.

(5) Effect of age, race, environment and resistance.

(6) Long duration or chronicity of the disease.

(7) The cost of medical care and the economic factor involved.

(8) Rehabilitation and after care.

(9) Relation of the disease to industry and the industrial hazards involved.

The objectives of the program are decreased morbidity and mortality and a corresponding reduction in the economic distress that either causes or results from tuberculosis. A variety of approaches are utilized to attain these ends, the first of which is properly the maintenance of a bureau of tuberculosis by the local health department. Its functions are to correlate and coordinate all tuberculosis activities in the community whether official or voluntary, including case and contact finding. It should secure prompt and accurate reporting of cases, including those in hospitals and other institutions. The bureau must tabulate and analyze morbidity and mortality statistics and maintain a complete and detailed record of all known cases of tuberculosis and maintain a close relationship with all available hospital facilities.

Educational activities will include radio addresses, talks to parent-teacher associations, welfare workers and other interested groups. This educational approach must be very persistently sustained at all times; circular letters, bulletins, posters, newspaper articles, window displays, floor displays at conventions and bazaars, and moving pictures will, in time, bring about a public consciousness of tuberculosis. It is by these methods, the National Tuberculosis Association and the numerous state associations have done such splendid work. Not the least of the educational measures is the relationship established between those in charge of the program and the medical profession, particularly the practitioners in any given community. Physicians engaged in general practice and industrial medicine are usually the first to see the tuberculosis case. They see him at a time when his disease is in the early stages, when a proper diagnosis is so important and the correct advice and management of the case are more needed than at any other time if the patient is to be saved and those around him protected from infection. I have often noted the enthusiastic reception by a group of physicians of a well presented talk or paper read on tuberculosis even when the subject matter contained much that may have been time-honored data familiar to every one present. Reiterated facts, if well presented, seem to receive the deepest attention and may recall some forgotten points to the mind of the hearer. The man in general practice today has an ever-increasing burden of information to store away for instant use as need arises. Few of us can hope to keep so much in mind and the facts of the modern aspects of tuberculosis are no exception. It must be remembered that tuberculosis is only one of the many conditions the general practitioner encounters on his busy round. The circular letter or bulletin sent out from the central health department office to the doctor by mail has a valuable educational place in the program. Manufacturers of good, bad and indifferent drugs and nostrums have long ago learned how great an influence can be exerted by advertising matter sent to the doctor in his morning's mail and, incidentally, many so-called "popular remedies" were first introduced to the public by using the family physician to do it! Surely the war upon tuberculosis might, in all honesty, be carried into the enemy's country through the doctor and with his knowledge and cooperation, he will be a better physician

and the public will be better served.

The doctor, on the other hand, must help by reporting cases promptly to the local health officer. Tuberculosis is a reportable disease but unfortunately the law is honored more in the breach than the observance. An interesting paper might be written upon why physicians do not report tuberculosis; suffice it to say many cases are not reported. The reporting of cases should not be permitted to impose any hardship upon the physician making the report and if this phase of the problem is handled with diplomacy he will be saved any embarrassment. In Baltimore, the physician making the report is called by telephone and his wishes consulted and respected in the matter of supervision he desires the health department to exercise in the treatment of the case and the handling of contacts. This plan has not only led to a rapid increase in the number of reports received, it has also tremendously increased the number of cases sent to the municipal clinic. In 1934, about twenty-five per cent of all cases admitted to the municipal clinic were referred by physicians, and this year the percentage will be even greater.

This matter of reporting tuberculosis calls for an honest facing of the facts. There appears to have been built up around the notification an element of secrecy. True, the report is a confidential matter, but in our efforts to preserve this confidence, the patient is permitted to live where and how he likes, to go about the community when and where he pleases and he is not prevented from working, if able. In this manner he is likely to infect many who come in contact with him. A few laws regarding careless spitting, the promiscuous use of drinking cups in public places and against known sputum positive cases from handling food have a doubtful value in curbing the activities of the open case. The very early case with no demonstrable tubercle bacilli in the sputum and the arrested and fibroid cases may be said to be non-infectious. Every other case is a grave menace to the community. I venture to say many an open case of tuberculosis causes, in the final analysis, as many innocent persons to die through infection, as does a maniac with homicidal tendencies.

The active case of tuberculosis should be removed to a sanatorium and kept there until cured, or, if he becomes too ill to afford hope of recovery, he should be placed in isolation in a nursing home or similar institution for the treatment of such cases. Late and infective cases should never be permitted to remain at home and the local health officer should be empowered to deal with the recalcitrant case by removing him forcibly if necessary. I do not believe such a measure would require frequent use. It has been my experience that eventually the most stubborn individuals will be persuaded to go to a sanatorium, the difficulty seems to lie in keeping him there. Patients break rules and are dismissed from sanatoria, often being refused readmission. It is much more difficult to persuade this type of case to re-enter an institution. The advent of artificial pneumothorax and surgery in the treatment of the disease should help in reducing the antipathy to compulsory hospitalization by speeding the date of the patient's return home.

Notification of a case of tuberculosis should afford the local health department the opportunity to make at least one visit to the patient's home. Contact thus established between the public health nurse and the patient or his family may lead to the prompt diagnosis of the disease through the examination of contacts. It is not necessary to divert these individuals from the private physician to a clinic, they may be sent to the doctor's office and he can thus remain in complete control of the situation. Many physicians welcome the advice to contacts by the visiting nurse because they have felt reluctant to advocate it themselves for fear of being misunderstood. The average physician is so honest he will bend over backward in his effort to avoid the appearance of soliciting work. On the other hand, as is often the case, the family that has spared no expense for the sick patient, is reluctant to

have examinations of the apparently well members, tuberculin testing of children and possibly x-ray study, either because of economy or indifference. In such instances, local health authorities should be ready to stand by and assist the physician by arranging for the free examination of the contacts. Finally, many physicians see the patients in their offices and know nothing of the home environment. The visit to the home by a competent and sympathetic nurse will bring to light many of the pitiful conditions under which these patients live and afford some measure of relief by directing them to welfare agencies, to say nothing of the many duties she may find to perform herself.

Open Air Classes and Preventoria.

It is very likely we shall have to revise our opinions as to the value of the open air class to the tuberculosis problem. In the antiquated buildings of former years, any room with open windows and a breath of fresh air was probably much better than the superheated atmosphere in which most of us wrestled with the three R's. Today, every modern school building is properly ventilated and not a few are air-conditioned. The real value of the open air class, in my opinion, is derived from the extra food furnished children in nearly all of these classes. Add to this that membership in such a class is a constant reminder to the child's parents to afford him extra care similar to that which he receives in the class-room. These children do receive a certain amount of rest but at best it is inadequate and usually consists of an hour reclining on a cot. Rest, to achieve any great benefit, should be taken in larger doses. It is quite evident there is a limit to the amount of time a school can devote to the bed-rest of pupils without seriously interfering with its function of educating them. In brief, the rest had better be administered in the home with the cooperation of parents. Failure to obtain this cooperation nullifies any good the open air class can hope to accomplish. In this connection I should like to observe the open air class may have quite the reverse of the anticipated parental reaction. Many people believe that if their children are receiving open air class care, this will suffice to keep the child in perfect health. Instead of engendering a heightened responsibility for the child's welfare, such individuals actually afford him less care and attention in his home life!

The preventorium is really still in the experimental stage. Our knowledge is still too limited to condemn or to indorse them wholly, but it is likely that preventoria can be utilized for a vast amount of good. It is only the methods used that are in question. I have recently made a study of ten children who had received preventorium care and later were sent to a sanatorium, in other words, an effort was made to find out why the preventorium did not "prevent." The study was made from the case histories of a local clinic and the records of a nearby preventorium. It should be noted that these ten cases were the *only* ones we could find in the six years the institution has been in operation. The group was too small for statistical study but detailed analysis of each case provided us with information of some value. One of the cases was merely sent to the sanatorium as an optional patient, having been offered this or further preventorium care. The sanatorium was elected. Another case remained in the sanatorium but six weeks and was dismissed as a behavior problem just as he had previously been forced to leave the preventorium for the same reason. He has not developed the disease subsequently and probably was not active. Three of the children were ex-sanatorium cases prior to their admission to a preventorium. Four were impossible behavior problems and could not be kept in a preventorium long enough to accomplish any beneficial effect. One of the cases developed his tuberculosis nearly four years after his preventorium experience and then only after fresh exposure to a new source of infection. There were only three cases that developed tuberculosis after having been in the preventorium in which neither behavior or previous sanatorium experience did not play a part. In one of these, the child had been severely in-

fected previously and it is thought, in the light of later knowledge, she should have been sent to a sanatorium in the first place. The second, we have every reason to believe was saved a much more serious break-down by her earlier experience in the preventorium. The third was an unfortunate child whose home environment was indescribably bad. This child made splendid response to the preventorium regimen but lost it rapidly under home conditions.

The study of these and other cases leads me to believe the prolonged stay (at least three months) in a preventorium under conditions approximating a sanatorium will do much to prevent the development of the disease. The child should not be dismissed to return to a home where he will be subjected to further exposure to an open case of tuberculosis, this merely delays the evil day of disaster. If the preventorium admits ex-sanatorium cases, these should be admitted promptly after discharge from the sanatorium and the preventorium might well be the stepping stone between sanatorium and home life and so play a part in rehabilitation.

The Tuberculosis Clinic.

The clinic constitutes one of our most important approaches. It is strategically favorable for the dissemination of a great deal of educational material and affords opportunities to teach physicians, nurses and social workers obtainable in no other way. It brings together the diagnostic methods used in recognizing the early ambulatory case with the social and economic phases of treatment and may well be used for the administration of refills in pneumothorax cases. It is headquarters for field tuberculosis work. Not the least of its activities is the maintenance of a consultation service for the general practitioner who wishes to refer his private patients for x-ray and physical examination or for tuberculin testing. It should be the source of supplies such as containers for specimens of sputum, paper napkins, disinfectants and sputum cups. Every patient should receive full instructions and advice and it should be the clearing house for all cases sent away for institutional care. The clinic may play an important role in the examination of cases for industrial clinics, acting in an advisory capacity to personnel or employment directors in the supervision and management of tuberculous employees, particularly those who have returned from sanatoria and require periodic examinations during their first year or so. In the same manner, the clinic maintains a close relationship with social welfare agencies, examining many applicants who apply to the agency for relief and in turn referring many families and individuals who may require relief during the period of treatment and rehabilitation of the patient.

The clinic should be equipped to carry out every procedure in diagnosing the suspected case. Freshly prepared dilutions of tuberculin should be available for the Mantoux test and the clinic should have an x-ray and fluoroscopic apparatus installed on the premises. The location of the clinic should be convenient to available street cars or bus service and if there are more than one clinic, it is well to establish boundary lines each is prepared to serve. The building should be owned by the municipality it serves, should be kept freshly painted and its rooms should be bright and cheerful. A definite hour should be designated for the admission of patients and only under exceptional circumstances should patients be admitted after the time stated. Courtesy, sympathy, dignity and a sense of humor are indispensable in gaining the confidence of patients. The human side must never be forgotten. Patients should be assured privacy in dressing and examining rooms. Confusion of any kind must be avoided and quiet is essential. Fine rales can not be heard in the presence of extraneous noise and a patient's life may depend upon the quiet and order maintained in the clinic.

Nursing Care.

No program for the control of tuberculosis can hope for success without the assistance of visiting nurses. It is a fact

often overlooked that the *first* public health nurses were tuberculosis nurses. The idea was developed in the early days of tuberculosis clinics because it was felt necessary to have patients followed in the home after diagnosis in the clinic. Later, to avoid duplication, these nurses assumed the duties associated with such activities as prenatal care, school hygiene and other medical inspections. To a degree, this was unfortunate, as tuberculosis is often relegated to the background in the generalized plan of today. If proper emphasis is placed upon their tuberculosis work, there is no particular reason to separate the tuberculosis field work from the department of general nursing. We must bear in mind, however, the average nurse has little opportunity to familiarize herself with this disease during training. Ward and operating room work in most hospitals offers few opportunities to study tuberculosis or any other phase of public health. This neglected feature of her training must be remedied, either during her training or afterward, and *before* she enters the field of public health work. There should be some effort made to familiarize the nurse in training with the modern aspect of public health methods; specialized training in tuberculosis might be given during or after graduation before she is admitted to the responsibilities of health department work and many nurses now engaged in public health work should be afforded a special course in the latest phases of tuberculosis field work.

Nurses engaged in tuberculosis work should have an intimate knowledge of case finding methods, the keeping of proper records, a knowledge of the disease, an ability to obtain relief for those in distress, and above all, an ability to teach. She must be able to instruct the patient and family, interpret the physician's orders, and afford wise counsel in a language they can understand. This is a tall order, but to be successful, she must combine all of these virtues with tact and cheerfulness.

Rehabilitation and After Care.

This is the most difficult part of the whole tuberculosis problem. The cured case must remain so if he is to avoid being an economic liability to the community. Most of the schemes for vocational training and rehabilitation are very expensive undertakings, and few communities have the temerity to embark upon them without some assurance of better results than can be demonstrated. Certain it is that at least twenty per cent of the cases remain permanent medical problems who might be classed as unemployables. Forty per cent return to their previous occupations on discharge from sanatoria, and the remainder will require special handling to refit them for a life of usefulness. This does not take into account the second group among whom there will be many relapses and who can only be taken care of by correlating the tuberculosis program, probably through the clinic, with industry.

The purpose of the scheme for rehabilitation must be to continue the process of healing in diseased lungs and not to become a species of concentration camp for incurables. Pneumothorax treatment will probably solve the problem for a great many of these cases. With the improvement in technique more and more clinics will adopt this method of treating post-sanatorium cases. In the meantime, the patient must be trained in some useful occupation. This instruction may be begun before he leaves the sanatorium, even early in the course of his treatment. Many sanatoria throughout the country have already offered facilities for special courses by coordinating this phase of treatment with the educational systems of their states, or through the Federal Board for Vocational Education. England has tried the industrial colony more extensively than this country, but as mentioned, the cost is so great few communities can afford them unless they can be made self-supporting and this appears to be rarely possible without confining the work to

such a narrow field of endeavor as to create a surplus of workers in the type of occupation for which they are trained.

Age, Sex, Race and Environment in Tuberculosis

No program can afford to neglect the effects of age, race, sex and environment. Tuberculosis is essentially a disease of the young. The early infection of children is too well known to require discussion. Year after year, in Baltimore, children admitted to the clinic are more than fifty per cent positive tuberculin reactors. They are, of course, contacts in the great majority of instances, but it is safe to say that twenty-five per cent of school children in large cities will be found to be positive reactors. The incidence of infection appears to be falling slowly but the rate is still very high. About two per cent of all children will be found to have demonstrable changes by x-ray examination but it is interesting to note the same percentage holds true of any industrial group. It is remarkable how little we really know of the mechanics of these childhood infections, and it is amazing what differences of opinion exist in reference to etiology, pathology and treatment of the childhood type of disease. In the Municipal Tuberculosis Clinic in Baltimore, we have long considered each case a problem unto itself and dealt with it accordingly. Experience would suggest that we are over-emphasizing the examination of young children when the group most in need of supervision is the high school student. The disease slays more young women between the ages of eighteen and twenty-five years than any other disease. It would appear from this the mass survey of young working women and girls as recommended by the White House Conference would be a sound procedure. In those communities with large Negro populations, no opportunity for mass survey of this race should be neglected. The Negro enters into our life a great deal more intimately than is generally realized because of the frequency of employment of this race as domestics, waiters and like occupations in which he is in immediate contact with our homes, the clothes we wear and the food we eat. His susceptibility to tuberculosis is marked and any program which omits a thorough approach to the problem through the Negro population of its community is inviting failure.

The home and working environment plays a tremendous part in the tuberculosis problem. The beginning of this century has seen great strides toward better housing and improved working conditions. Hours of work have been steadily reduced in all branches of industry, and this, coupled with improved sanitation, better food control, more sensible clothing and widespread indulgence in out-of-door sports and pastimes have largely contributed to a lowered tuberculosis morbidity. The pasteurization of milk and the inspection of cattle for tuberculosis are simple examples of food control that have doubtlessly saved thousands of lives. Tuberculosis death rates rise in direct proportion to the amount of crowding in any given section of the community; we are now slowly outgrowing the alley and tenement of the past. Slum clearance is actuated by a worthy motive, but is too costly to be fully carried out. Destruction of festering blocks of property in large cities may accomplish a certain amount of good to the extent they remove so many dark and badly ventilated houses favorable to the growth of tuberculosis. Destroying one or two blocks, or even more, merely scatters the population of those blocks to other neighborhoods which in turn become slums. Such a program can not be effectual unless carried out on a very much wider scale than the average community can afford to attempt, but if it is persistently pursued, all buildings capable of conversion into slum districts are eventually destroyed.

It is of interest that most of the improvement in living and working conditions has come about gradually and is not the result of any plotted program, but it has done more than anything else to reduce the incidence of tuberculosis. This

is particularly true of industry, where better working conditions and care of employees has been found to yield large dividends. Most industrial plants that have become awakened to the tuberculosis problem found themselves already equipped with clinics, physicians, nurses and welfare services that had been inaugurated for other and more general reasons. It is the small plant and store which the municipal clinic can help most in the handling of tuberculosis cases as they arise.

In conclusion I should like to call attention to the epidemic nature of tuberculosis. We know from observation that certain diseases become epidemic in cycles; measles and influenza are notable examples. Since the beginning of this century there has been an almost uninterrupted decline in the mortality rate of tuberculosis. Most of us are familiar with the graph published by the Metropolitan Life Insurance Company in its Statistical Bulletin, Vol. XIII, No. 12, December 1932, which is plotted from the death rates from all forms of tuberculosis in the original registration states and District of Columbia. A mean line drawn through the curve drops to zero in 1941. Later computations have placed this a year or two further on, but in any case the most sanguine can scarcely believe the tuberculosis death rate will reach zero prior to 1950. As was to be expected, the curve straightened out somewhat in 1933 and 1934, and this year we are witnessing, in Baltimore, at least, a marked upward trend in the morbidity and mortality rates. I venture to believe this will be borne out in many other localities.

Tuberculosis is an epidemic disease, whose cycles move in periods of many decades. It is quite possible we are surviving two, and possibly three epidemics of tuberculosis, one which attacked old persons and is about exhausted, one which attacked persons in the forties, and is also about over, and a more recent epidemic that attacked young people. This would account for the large number of youthful persons who succumb to the disease and several other incongruities of tuberculosis as we see it. In the course of such epidemics, there must be wide variations from time to time with the death rates working downward over the long period but rising at intervals due to such cataclysms as the late war, the influenza epidemic and the present depression. Certain it is, we are due for such a rise. While the depression has driven many persons to clinics and more reporting of the disease is likely from this source than the private practitioner, it will not explain the sharp rise in both morbidity and mortality rates that appear imminent. The economic crisis through which we are passing has caused people to live in crowded conditions, to subsist on less food, to work longer and harder when work was to be had, and to forego the rest, recreations and vacations they have known in the past. We are nearing the end of the sixth year of the depression and this involuntary reduction in the living standards of so large a part of our population is beginning to make itself felt. Tuberculosis is a slow-moving disease, and we are probably seeing the result of infection that occurred three and four years ago or of relapses that began at that time and are just making themselves manifest. We may well expect to witness a rising morbidity and mortality rate in tuberculosis and it may be that when prosperity makes its long awaited turn around the corner, it may find us embattled with an epidemic of this disease.

SUNLIGHT IN TUBERCULOSIS . . . . (Continued from page 10)

is relatively cool, as in the morning or late afternoon. This is especially important in summer and in low altitudes, although in the highest altitudes, and in winter, the air is often cool enough at all times. The sunbath, when accompanied by a hot-air bath, becomes a veritable Turkish bath, the effects of which are the opposite of those desired, i.e., fatigue and depression result instead of the bracing and stimulating effect which should follow proper application of the treatment.

Today many lamps are manufactured to produce artificial ultra-violet light.

These lamps are often convenient and in many localities are necessary because of the lack of sunlight. The results achieved with them are very satisfactory, but are never as successful as natural sunlight. Whenever lamps are used, the room should be ventilated well, for the moving air is one of the necessary features required for good results with heliotherapy. The time of exposure with most lamps should be one half of the time used for natural sunlight, the lamp being at a distance of thirty inches from the body. When the distance from the lamp is shortened the time of exposure should be proportionally shortened.

The discovery of the curative powers of light has added an effective agent to the armamentarium of the physician and has aided many sufferers in their struggles to obtain health. The good results produced by this helpful agent, however, depend solely upon its proper use; for where it is used indiscriminately, it has frequently produced harm instead of benefit. It is hoped that in the future all users of this method of treatment will seek competent advice before they expose themselves to ultra-violet light.

EARLY PULMONARY TUBERCULOSIS . . . . (Continued from page 14)

there be something to prevent the closure of these cavities by pneumothorax, consideration is given to what may be added to this pneumothorax to make it successful. Many unsuccessful pneumothoraces have been changed into successful ones by doing a phrenic interruption in conjunction with the pneumothorax. Adhesions attached above and to the diaphragm often act as a guy-wire, pulling open the cavity with every respiration. Often relaxation by paralysis of that half of the diaphragm will allow the pneumothorax to collapse the cavity which otherwise could not be closed. Likewise cauterization of adhesions, when feasible, will convert an unsuccessful pneumothorax into a successful one. In some cases open operation to divide adhesions is necessary and is indicated when the closed method fails. Finally, if the lesser measures have failed to bring about a satisfactorry termination of the disease, thoracoplasty must be considered, and has saved many lives that were hopelessly doomed without such surgery.

Now to reiterate and summarize: (1). Where there is pulmonary tuberculosis, it is treated best by collapse measures irrespective of stage of the disease. We are convinced that there will be fewer cases with cavitation and extension of lesions, if they are treated with collapse before cavitation occurs. Furthermore, there will be fewer of the patients who present themselves with cavitation to go on to far advanced lesions if they receive effective collapse therapy as soon as the diagnosis is made. (2). When and if one measure fails, one should go immediately to other measures and continue so, one after another, or concurrently, until the disease process is arrested. (3). Collapse therapy is not a last resort method. Its percentage of cures will be in direct proportion to its use in earlier cases, and morbidity and mortality will be proportionately reduced. (4). Any patient with enough pulmonary tuberculosis to be diagnosed as such should be treated with collapse therapy in addition to bed rest.

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ABSTRACTS

This department is devoted to abstracts of articles carefully and judiciously selected by the Editorial Staff.

HAMILTON, C. E. & ROTHSTEIN, EMIL: Air Embolism. Journal of the A. M. A. Vol. 104, No. 25, June 22, 1935.

Cases of air embolism may be divided into two large groups—one in which air gains entry to the peripheral nervous system, and the other in which air enters the pulmonary venous circuit.

Air embolus resulting from air entering the peripheral circuit has been encountered in practically every surgical field. The entrance of a small amount of air in the peripheral circulation has no effect—being simply absorbed in its passage through the lungs—but the entrance of a large amount (160 c.c. in dogs) interferes with the efficacy of the right heart action. Owing probably to the easy compressibility of the air, the valves are not properly opened and the circulation comes to a standstill. To this is added the development of an acute hypertension of the lesser circuit due to a very diffuse capillary block of the pulmonary vessels by air bubbles.

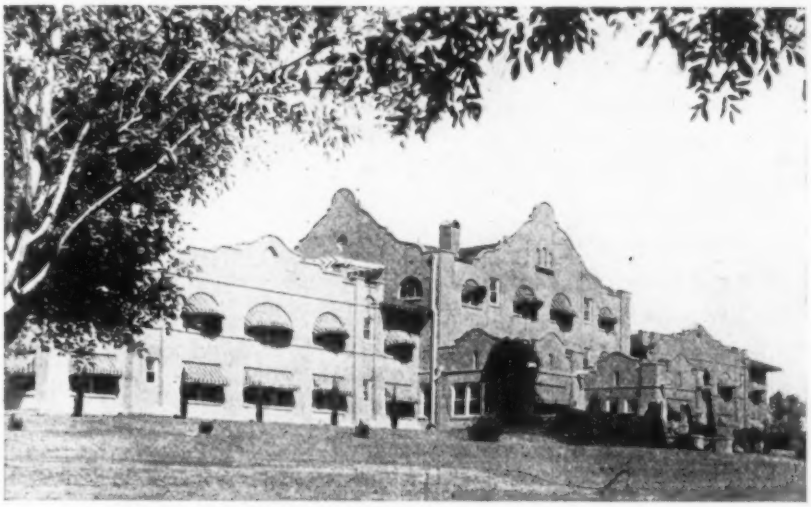
Entry of air into a peripheral vein is possible (a) when a vessel is only partly severed, preventing collapse, or even in complete severance when the surrounding tissues are firm, thus preventing venous collapse and retraction or (b) the venous pressure is negative and the air pressure positive. Probably the most frequent source of air embolism is in the region of the great veins of the neck in accidental wounds, or following thyroid or other operations. Here both of the above conditions exist. Fracture of the long bones, especially the tibia, manipulation of the puerperal uterus, irrigation of the maxillary sinus, injection of air into the bladder, etc., have been followed by air embolism.

The authors are particularly interested in air embolism resulting from air entering the pulmonary venous circuit—the majority of which follow artificial pneumothorax. Other causes are injury to the chest wall and lung, pleural lavage in empyema, etc. When air enters the pulmonary venous circuit it passes through the left side of the heart, and is pumped to the peripheral circuit—hence possibly to the cerebral circulation. The authors report nine cases of air embolism occurring during artificial pneumothorax.

It is pointed out that the tuberculous lung is fibrotic, firm and frequently adherent, with thick vascular pleural adhesions and, therefore, normal vascular collapse and retraction of the pulmonary veins is not present. Also the pressure in the pulmonary veins is normally 14 to 16 cm. of water less than atmospheric and from 5 to 6 cm. of water less than the intra-pulmonary pressure and this difference is accentuated when the air pressure is increased by the pneumothorax machine or by coughing.

The perforated vessel through which the air enters may be in the lung or in a vascular adhesion. The air may come from one of four sources: (a) It may be induced by the operator from the pneumothorax apparatus, (b) it may be sucked in from the tubing of the manometer, (c) it may be sucked in from an alveolus or bronchiole, the bevel of the needle acting as a connection between the air sac and the blood vessel, or (d) by a similar action it may be sucked or forced in from the pleural space if a partial pneumothorax already exists. Air embolism occurs about once in every 500 to 1000 pneumothorax treatments.

It is pointed out that practically always on introduction of the needle in these cases the manometer readings are found to be unsatisfactory, resulting in either no



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fluctuation or those characteristic of intrapulmonary pressures (—2, +2). The symptoms of embolism may manifest themselves before any air is introduced, or after a variable amount has been allowed to run in—anywhere from 10 to 500 c.c. Similarly they may appear when the needle is in place, immediately on its withdrawal, or after several minutes.

As a warning sign the patient may cough up a small amount of blood, or blood may well up through the needle. Often the patient will first complain of feeling queer, or of local pain, or of severe coughing. The first sign is usually pallor, followed by intense cyanosis, bradycardia, loss of consciousness, convulsive twitching, apnea or respiratory difficulty, urinary or fecal incontinence and vomiting. Focal neurologic signs may appear at once or not until the elapsing of a variable number of minutes. Any part of the brain may be involved; the commonest of the easily recognized syndromes is hemiplegia.

Prognosis—Air embolism is fatal in percentage varying from 15 to 50. In this reported series the rate was 22%. On the other hand, the prognosis of the patient who survives the first ten or fifteen minutes after the accident is good, and after one hour has elapsed the danger is very slight, even in the face of persistent coma or paralysis. The prognosis of recovery of the focal neurological lesions is also good.

Therapy—Prophylaxis is the most important; use of a blunt needle; use of especially constructed syringes; use of air under negative pressure, especially in the first injection; place head of the patient downward; keep the patient on the table for ten to fifteen minutes after injection, etc. Air should *never* be given unless the fluctuations are those of intrapleural pressure.

Treatment after cerebral embolism has occurred is symptomatic and may vary from simple reassurance to epinephrine (intravenously or intracardiac if necessary) caffein, artificial respiration, and the like, depending on the manifestations in the individual case. If there are no other contraindications, artificial pneumothorax may later again be resorted to.

It is frequently difficult to differentiate air embolism from pleural shock. The two phenomena may produce identical primary symptoms, but focal neurological conditions such as hemiplegia are not usually seen in simple pleural shock. In any event, the treatment of the two conditions is identical.

GARRISON, HARVEY F: Lipoid Pneumonia in Children. Southern Medical Journal 1935. 28:4.

The author reports a case of Lipoid Pneumonia due to the aspiration of liquid petroleum. He also cites forty-one cases reported by other observers of pulmonary inflammation due to the aspiration of lipoids.

The increasing use of a variety of oils in pediatric practice, in the treatment of vitamine deficiencies, in disturbance of the gastro-intestinal tract, and by the local application of oils into the naso-pharynx, larynx and trachea has occasionally been attended with unexpected pulmonary disease.

It has been conclusively shown that small amounts of oil administered by mouth and in the naso-pharynx, may, by coughing, strangling, etc., be aspirated into the trachea, ultimately reach the alveoli, and produce a lipoid pneumonia.

In the cases reported only a few have been diagnosed before death; the great majority have been diagnosed post-mortem. This is mainly because the initial lesion in the lungs is not sufficiently widespread to show any characteristic clinical or roentgenological signs.

It has been suggested that a diagnosis can be made if there is a history of administration of an oily substance via the naso-pharynx or orally over a long period of time, which, if followed by a hacking cough, rapid respiration without dyspnea, a typical pulmonary consolidation, which is central posterior and mostly on the right, when present in a debilitated infant, should make one suspect lipoid pneumonia.

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Tuberculosis, must of course, be ruled out. The finding of mononuclear cells containing lipoid substances in expectorated material has been suggested but not conclusively proven of diagnostic value.

In the light of the present findings relative to the use of lipoid substances it would seem to be the best policy to sound a note of warning and to advise the necessary precautions as to their general use.

WILSON, EDWIN B. and MAHER, HELEN C.: **Cancer and Tuberculosis, with some Comments on Cancer and Other Diseases.** Am. Jr. of Cancer, 1932, xvi, 227-250.

From pathological and epidemiological evidence opinions at variance with one another have been arrived at in respect to the simultaneity of cancer and tuberculosis. Some have maintained that cancer and tuberculosis are antagonistic, some that one disease favors the occurrence of the other, and some that the incidence and progress of the two conditions are independent. (This question has been considered previously in the ANNALS: 1929, iii, 495-500; and 1929, iii, 501.) The difficulties involved in arriving at a sound judgment and the various statistical fallacies which must be avoided or minimized are considered in the course of a mathematical treatment of the problem. It was concluded that there seems to be little or no evidence in favor of an antagonism or dissociation between cancer and tuberculosis, and a considerable variety of evidence in favor of a slight degree of positive association between the two. Until better estimates of morbidity rates are available one should not be dogmatic over the matter and may well admit that for practical purposes cancer and tuberculosis may be regarded as independent. There seems to be considerable evidence that cancer of the esophagus is associated with pulmonary tuberculosis, as might perhaps be natural if the condition resulted in a long-continued malnutrition. At present there seems to be no material which should lead to a judgment as to whether cancer and tuberculosis tend to originate in the same persons because of constitutional diathesis, or whether the association might result merely from an invasion of one of the processes by the other or a lowered resistance to the progress of one of the diseases owing to a debilitation by the other.

WEBB, GERALD B.: **Pulmonary Tuberculosis.** Annals of Int. Med. Vol. 2, No. 1, p. 56.

Infection:

Adult ulcerative pulmonary tuberculosis exemplifies the achievement of the life cycle of the human tubercle bacillus. Egress of the parasite is now accomplished so that it is free to attack other victims. It has been long recognized that adult pulmonary tuberculosis is a reinfection of a patient previously infected and partly immune; but whether such infection is endogenous or exogenous is a topic extensively debated. The author concludes that endogenous reinfection is responsible in most instances.

Bushnell considered that adult pulmonary tuberculosis was due to a second infection from within and this second infection spread from an original infection by virtue of accumulated toxic products together with the bacilli. Bacilli which filter through the lungs and pass to the tracheo-bronchial lymph nodes may die out, or hibernate, and it is conceivable that they may rekindle and develop into active pulmonary disease many years after the original infection.

Treatment:

The author several years ago advocated postural rest, and, in bilateral apical and other lesions, the application of shot bags as adjuncts to the rest treatment in tuberculosis. Postural rest is based on the principle that the dependent lung of a patient lying on the side is placed at rest; areation is decreased and the lung area is reduced. A small hair pillow placed under the chest decreases motion and makes the patient more comfortable.

In bilateral cases shot bags 5 inches square and weighing one to one and one-half pounds are placed on the chest with the patient lying flat on the back. Such a procedure limits the motion of the chest thus producing increased pulmonary rest.

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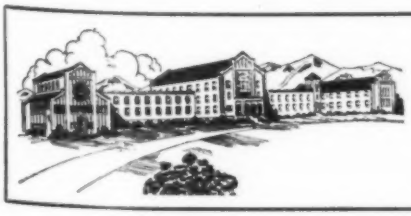

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QUERIES AND ANSWERS

Careful attention given to all queries.
Names will be omitted if so desired.
EDITORIAL OFFICES 1018 Mills Building, El Paso.

Q. What are the routes of infection in tuberculosis?

A. Tubercle bacilli may enter the body with the inspired air, with food or with swallowed saliva. They may enter through the mucous membrane of either the respiratory or gastro-intestinal tract, through the skin, or through the tonsils.

The fact that most lesions are confined to the lungs has made the aerogenous route the more plausible to many, but those who believe in the ingestion theory point to the fact that bacilli which enter through the gastro-intestinal tract may be taken up with the chyle by the lymphatics which empty into the thoracic duct and be poured into the subclavian vein and carried on through the right heart into the pulmonary circulation. The first opportunity for bacilli which are absorbed with the chyle to be detained after being absorbed from the intestinal mucosa would be in the capillaries of the lung.

Q. Am I correct in the assumption that pulmonary tuberculosis should not be treated by heliotherapy?

A. You are. Patients with active pulmonary tuberculosis should not be subjected to direct exposure to strong sunlight. Indirect diffused light is, of course, beneficial. Heliotherapy is indicated in childhood and extrapulmonary disease.

Q. What are the most common sources of tuberculous infection and how may they be controlled?

A. The most common sources of infection are: dried sputum; droplets which are thrown out by cough; bacillus-contaminated articles of food, particularly milk; and clothing and wares of various kinds infected through handling. It is obvious that these sources are of such character that they may be eliminated by proper education and necessary laws. Indeed, infected milk is a rarity in urban districts due to laws requiring careful examinations of milk handlers, and tuberculin testing of cows. A more rigid enforcement of ordinances requiring examination of all food handlers, proper sterilization of dishes in restaurants, soda fountains, etc., and the ordinance prohibiting spitting in public places would materially cut down the incidence of tuberculous infection in a community.

The source of all infection is the tuberculous patient. If each patient is instructed in the proper methods of preventing a spread of his disease to his own household and friends, part of the battle of tuberculosis control is won. Isolation, precautions, disposal of sputum by burning, sterilization of the patient's dishes and utensils, etc., are essential in the control of infection.

Q. How long should artificial pneumothorax collapse be carried on in a given patient?

A. It is impossible to judge accurately in advance just how long collapse must be maintained in any patient before he may be considered cured. Phthisiotherapists of wide experience teach that the lung should be kept collapsed for at least three years after symptoms have subsided. It is obvious that the stage of the disease, the number and size of cavities, the patient's history, etc., should enter into the equation. It is impossible to tell when complete healing has been accomplished until the lung has been permitted to expand. Adverse symptoms during the period of re-expansion may indicate that a further period of collapse is necessary. X-rays of the chest taken before the lung is completely re-expanded are helpful. Even with these precautions, however, it is difficult to be certain that there is no danger of a breakdown in the apparently healed lesion. Reexpansion of the lung necessarily means stretching and pulling of the scar tissue and may result in renewed disease.

Q. Are pleural shock and gas embolism frequent complications of pneumothorax, and do they contraindicate further pneumothorax therapy in a given case?

A. Pleural shock is said to occur in about one in 500 pneumothorax treatments. One pleural shock incident does not preclude further treatment, but if the phenomenon is repeated in the same patient, pneumothorax therapy should be discontinued.

Gas or air embolism occurs about once in 500 to 1000 pneumothorax treatments. Unless there are other contraindications, this accident does not preclude further pneumothorax. There is an interesting abstract on this subject in this issue.

CASE, JAMES T.: Tuberculosis of the Gall Bladder. Annals of Int. Medicine, Vol. 1, No. 7, p. 482.

Tuberculosis of the gall bladder is one of the rarest of pathological findings. The author was able to find only ten authentic cases, including his own reported case, proved by microscopical examination of the tissue. There are two forms of the disease, chronic ulcerative tuberculous cholecystitis and an acute miliary tuberculous cholecystitis. Of the cases in the literature, eight were of the chronic type and two were miliary; nine were in females and one in a male aged 57; five of the eight chronic cases were associated with cholelithiasis.

Tuberculosis of the gall-bladder has no clinical entity, and cannot be differentiated clinically from other forms of cholecystitis. Cholecystotomy should be performed in any case in which, at operation, a suspicion of gall bladder tuberculosis arises.